



## Refractive Pathology in the Bukhara Region: A Comparative Study in Young Children and Adolescents

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**Abstract:** Refractive errors are present when the optical image does not accurately focus on the retina. Preschool-age myopia is linked to a significant hereditary burden, while in teens, the prevalence of myopic refraction is related to the level of visual stress. The purpose of this article is to compare refractive errors in children of kindergarten age and schoolchildren in Bukhara region, identify their causes, and develop measures to prevent risk factors. Based on this goal, 428 boys and girls of preschool and school age were selected, and the main (visometry, autorefractometry, tonometry, skiascopy) and additional (exobiometry, OCT) examinations were conducted. The results show preschool-age myopia is linked to a significant hereditary burden, while in teens, the prevalence of myopic refraction is related to the level of visual stress.

**Key words:** myopia, hypermetropia, pediatrics, ophthalmology, refractometry, adolescents in school, exobiometry, OCT.

**Relevance.** Refractive error, the main factor contributing to decreasing visual acuity, affects approximately 1.5 billion people worldwide.<sup>[1]</sup> The number of people globally with refractive errors has been estimated at one to two billion.<sup>[2]</sup> Rates vary between regions of the world with about 25% of Europeans and 80% of Asians affected.<sup>[2]</sup> Near-sightedness is the most common disorder.<sup>[3]</sup> Rates among adults are between 15-49% while rates among children are between 1.2-42%.<sup>[4]</sup> Far-sightedness more commonly affects young children and the elderly.<sup>[5][6]</sup>

The number of people with refractive errors that have not been corrected was estimated at 660 million (10 per 100 people) in 2013.<sup>[8]</sup> Of these 9.5 million were blind due to the refractive error.<sup>[9]</sup> It is one of the most common causes of vision loss along with cataracts, macular degeneration, and vitamin A deficiency.<sup>[10]</sup>

Its development appeared to have started earlier in recent years.<sup>[10]</sup> Eye pathology is third in the hierarchy of childhood morbidity.<sup>[10]</sup> Numerous visual problems affect 19 million youngsters, according to WHO estimates. Myopia, hyperopia, and astigmatism are the refractive defects that account for 43% of them. 26% of recent graduates from high school have myopia.<sup>[11]</sup> Visual strain is the source of blurred vision, which can cause myopia to develop. A long-term high accommodative

tone known as habitually excessive tension of accommodation (HATS) produces myopization of manifest refraction but does not lower the maximal corrected visual acuity. <sup>[11]</sup> PINA has a significant impact on how a child's refraction develops, and when combined with other risk factors like physical inactivity, weakened overall health, helminthic infestations, gastrointestinal tract disorders, liver disorders, tonsillogenic and otogenic intoxication, and caries, myopia develops and progresses. In both acute and chronic inflammatory disorders, the ciliary muscle's function is found to be impaired. <sup>[12]</sup>

**The aim of our research** was to compare an analysis of the prevalence of refractive pathology in preschoolers and school-age children in Bukhara with advice for general practitioners on how to prevent the development of myopia.

**Method and Material.** 428 children were examined medically, including 244 preschoolers (kindergarten students, first age group) and 184 schoolkids (second group). The average age of kindergarten students was  $5.30 \pm 0.01$  years, and that of schoolers was  $14.28 \pm 0.02$  years. There were 48,9% boys and 51,1% girls. Studied the genetic nature of visual impairment across a two-generation period. There was a physical examination performed, including ophthalmoscopy, sciascopy, autorefractometry using an autorefractometer powered by SHIN-NIPPON, Germany, and measurement of the severity of vision. Excel tools were used to statistically process the results. A student's t-test for small samples with a 95% confidence level of reliability underwent critical investigation.

**Conclusion and Results Examining.** 428 youngsters of various ages, high emmetropia was found in 190 (44,39%), hypermetropia in 106 (24,77%), and myopia in 67 (15,65%) of the children. 16 (3,74%) children with myopic astigmatism, 5 (1,17%) had anisometropia, and 44 (10,28%) had hypermetropic astigmatism. Table 1 shows the findings from research on refraction in preschoolers of various ages. According to the test results, 45,9% of preschoolers had emmetropia, which is consistent with their age-related physiological refractogenesis. 36,0 % of those evaluated had hypermetropia, including a weak degree in 15,19%, moderate degree in 4,2%, and hypermetropic astigmatism in 15,57% of youngsters (see Table 1). There was no evidence of clear myopia in this age range. In 6 (2,44%) of the children, myopia with myopic astigmatism was found; genetic causes account for 50-55% of these cases [4]. The lifetime incidence of myopia in children is 1,2-3,8% by their first year, and it peaks at age 6 [5]. Studying refraction in children aged 14 to 15 revealed that 42,4% had emmetropia, 9,78% had hypermetropia, 3,26% had hypermetropic astigmatism, 36,41% had myopia, 5,43% had myopic astigmatism, and 2,72% had anisometropia (Table 2).

**Table 1.** Kindergarten kids' refractive levels; ( % )

Gender	Emmetropia	Hypermetropia	Hypermetropic astigmatism	Myopia with myopic astigmatism
Boys (n=118)	60 (24,6)	47(19,2)	21 (8,6)	3 (1,22)
Girls (n=126)	62 (21,3)	41 (16,8)	17 (6,97)	3 (1,22)
Total (n=244)	112 (45,9)	88 (36,0)	38 (15,57)	6 (2,44)

**Table 2.** Refractive indices of schoolchildren, (n%)

Gender	Emmetropia	Hypermetropia	Hypermetropic astigmatism	Myopia	Myopic astigmatism	Anisometropia
Boys (n=91)	38 (20,6)	10 (5,43)	3 (1,63)	39 (21,19)	6 (3,26)	2 (1,09)
Girls (n=93)	40 (21,74)	8 (4,35)	3 (1,63)	28 (15,21)	4 (2,17)	3 (1,63)

Total (n=184)	78 (42,4)	18 (9,78)	6 (3,26)	67(36,41)	10 (5,43)	5 (2,72)
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Similar to preschoolers, mild hypermetropia (8,15%), moderate hyperopia (1,63%), and hypermetropic astigmatism (3.26%) were the most common diagnoses in teenagers. The majority of children (24,45%) who had myopia had mild cases; in males, the range was up to  $-2.82 \pm 0.41$  diopters, while in girls, it was  $-2.03 \pm 0.22$  diopters ( $p > 0.05$ ). 7,6% of those who were examined had moderate myopia, while 4,35% had high degrees. The hereditary burden connection was shown to be unreliable ( $p > 0.05$ ).

According to the analysis of the data, emmetropia and hypermetropia occur less frequently in teenagers than in preschoolers (3,5 and 26,22 %, respectively), while myopia with myopic astigmatism is more common (39,4 %). Myopia rates rise in youngsters as they get older. 33.7 % of the evaluated adolescents had a diagnosis by eighth or ninth grade (14 to 15 years old) ( $p > 0.05$ ).

### Conclusion.

Myopia has increased in the second age group, and pathophysiological alterations are thought to be responsible. Adolescents' bodies undergo hormonal changes, rapid organism growth, and, as a result, the strong visual burden as well as the unrestrained use of contemporary technological technologies in education, particularly the intensive intensity of visual workloads on a daily basis, which data from the literature [4, 9, 11] support. This should be considered when performing preventive work with adolescents. Sciascopic studies were carried out at fixed ages, enabling uncomplicated diagnosis, the discovery of refractive disease, and the cure of refractive abnormalities in children and teenagers. Early detection of pathogenic alteration: children should undergo these procedures after birth. Before the start of doctor visits to kindergarten and school at the clinic, an ophthalmologist. Specialists like ophthalmologists, pediatricians, general practitioners, school doctors, teachers, and parents working together will continue to be successful. General practitioners' educational efforts can be particularly beneficial in the prevention of vision problems connected with, firstly, those who lead unhealthy lifestyles in halting the progression of myopia.

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